# Sequential Stage System Testing

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ftware Quality Research Labo

# Background

- M. W. Corum, *Markov chain testing models for sequential-stage system reliability growth via failure mode removal*, Master's thesis, The University of Tennessee, May 2002.
- Gaver, Jacobs, Glazebrook and Seglie, "Probability models for sequential-stage system reliability growth via failure mode removal, International journal of Reliability, Quality and Safety Engineering, Vol. 10, No. 1 (2003) 15-40 [Technical report available in 1999.]


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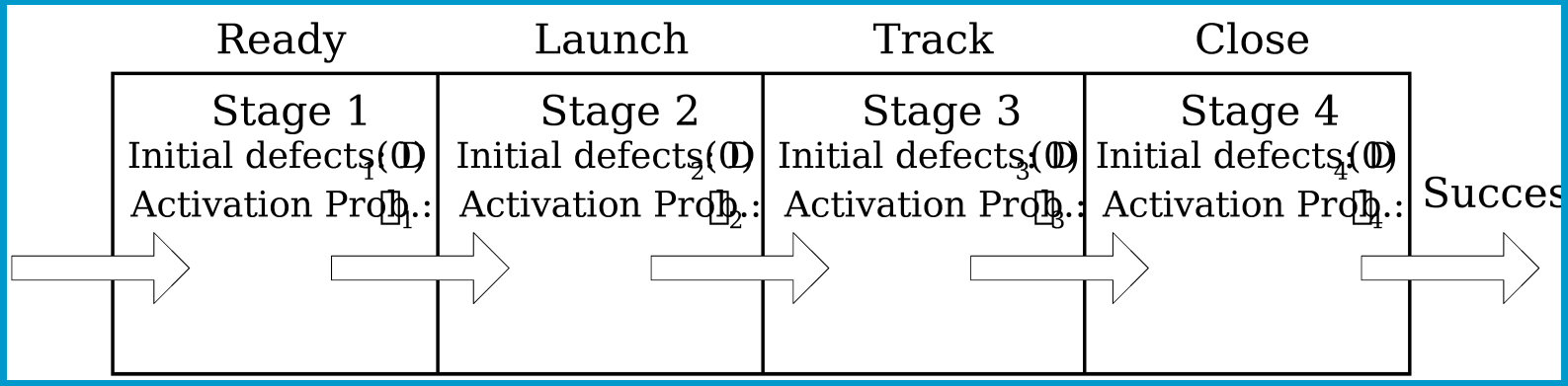
# Sequential stage system testing

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# Major questions (by Gaver)

- **Probability of system field success based on number of tests run**
- Number of tests required to achieve the j-th end-to-end success
- Number of tests required to achieve M consecutive end-to-end successes



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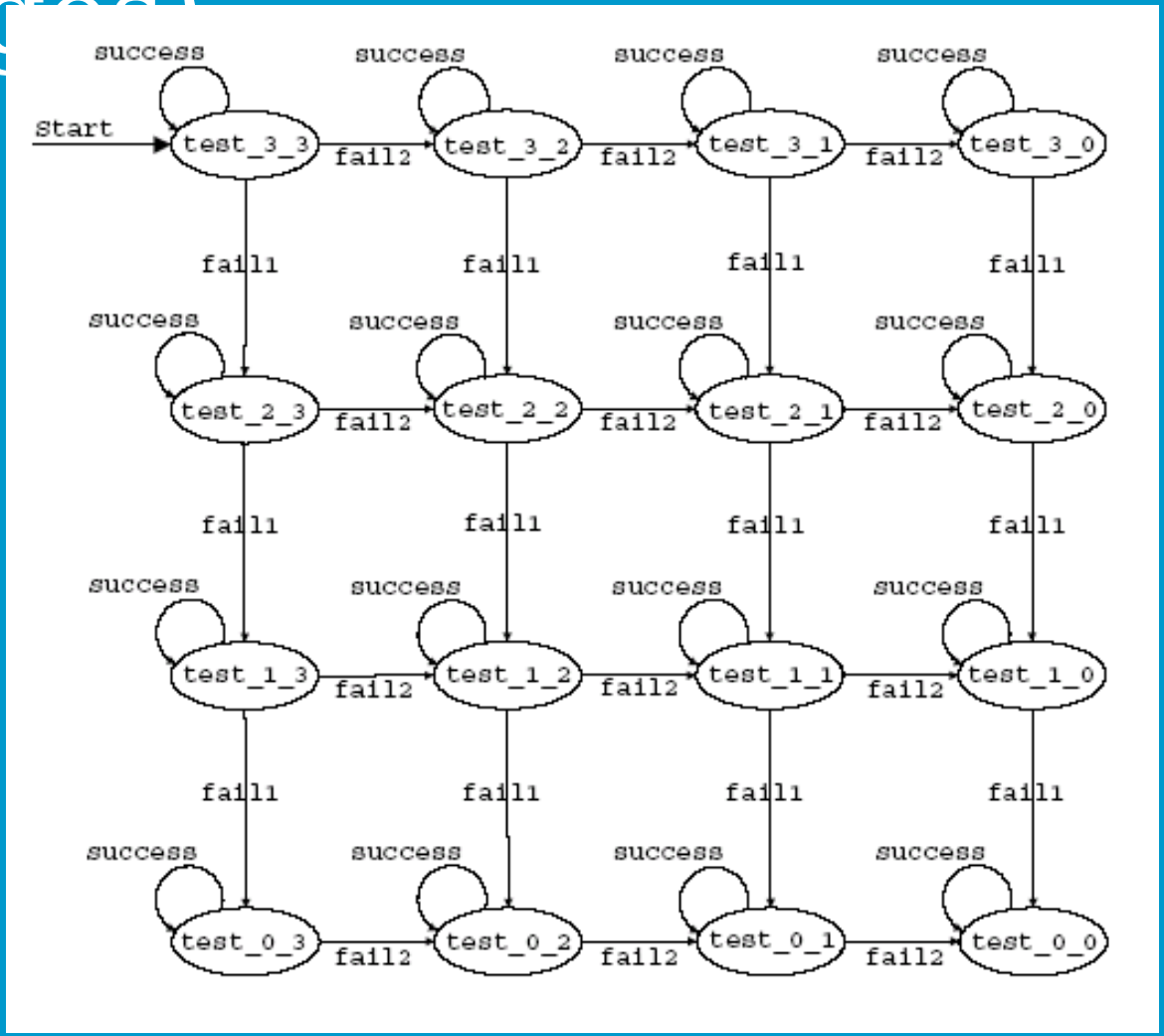
# Example testing model (2-stages)

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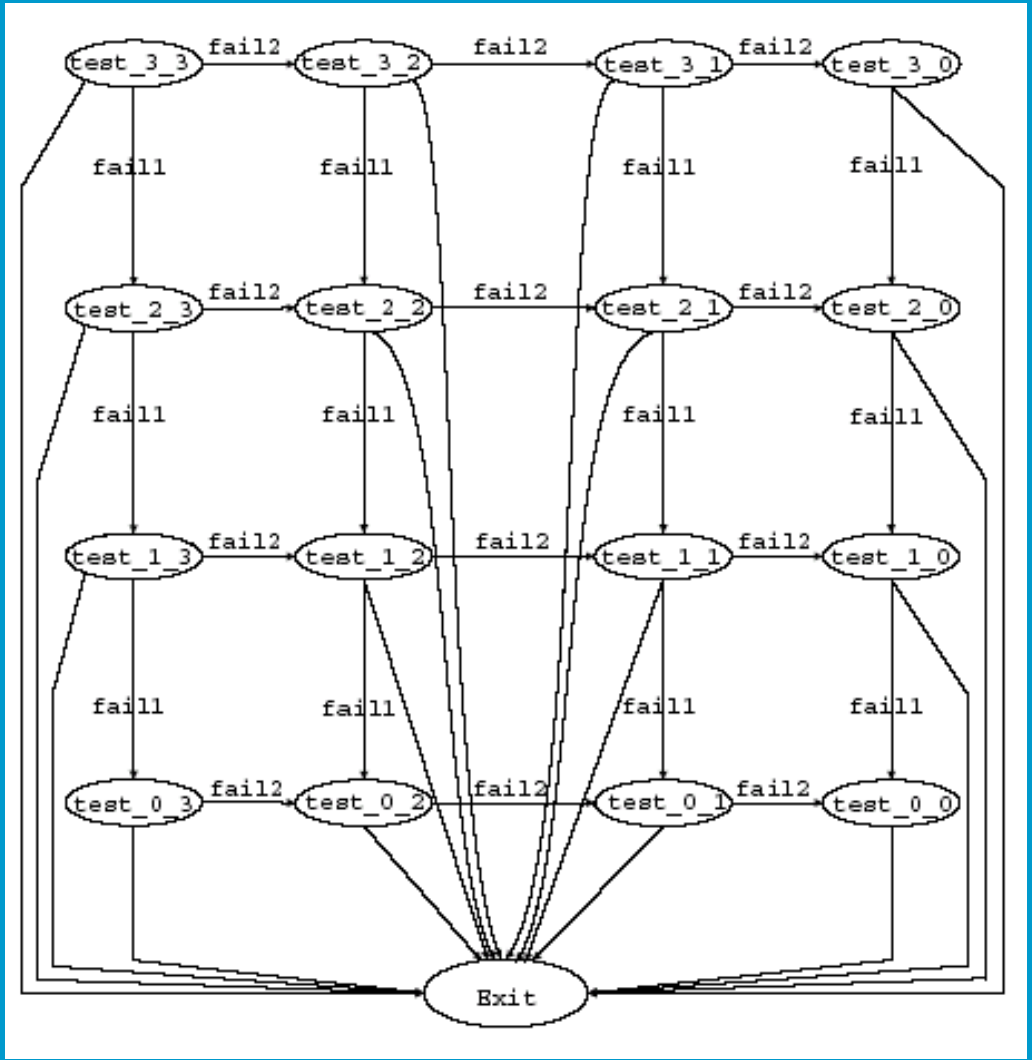
# 1-success model

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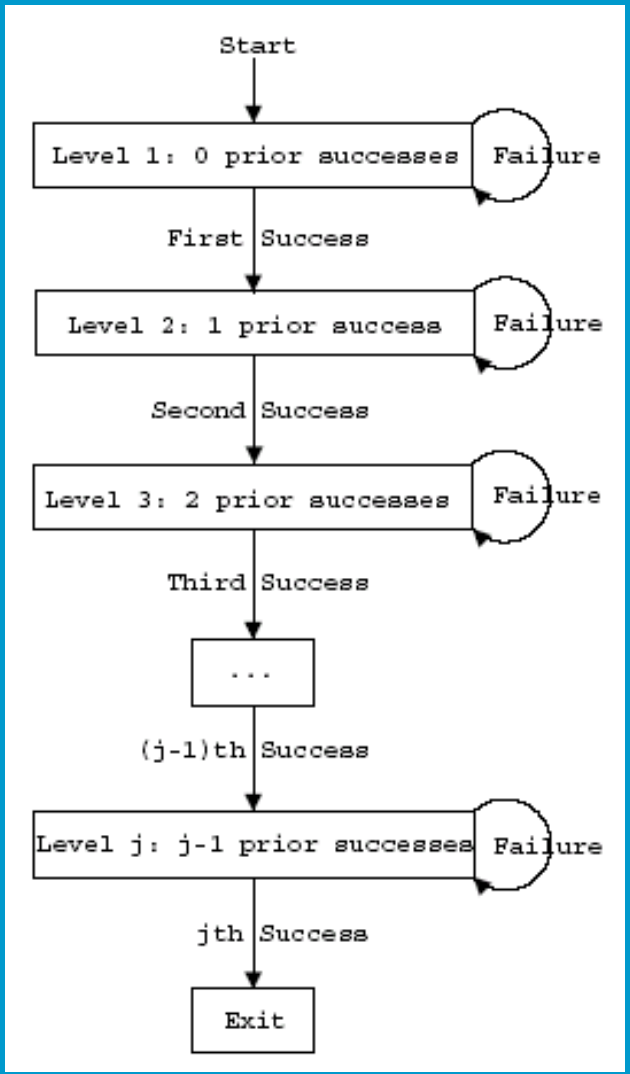
# J-success model

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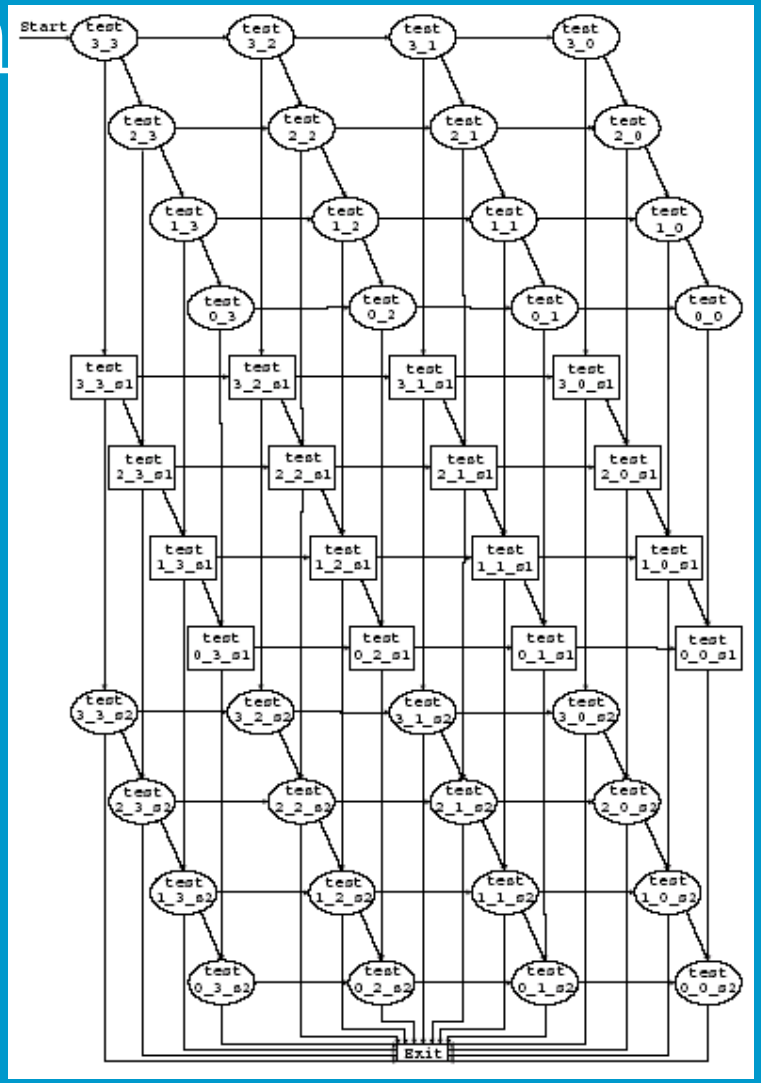
# 3-success model for 2-stage system

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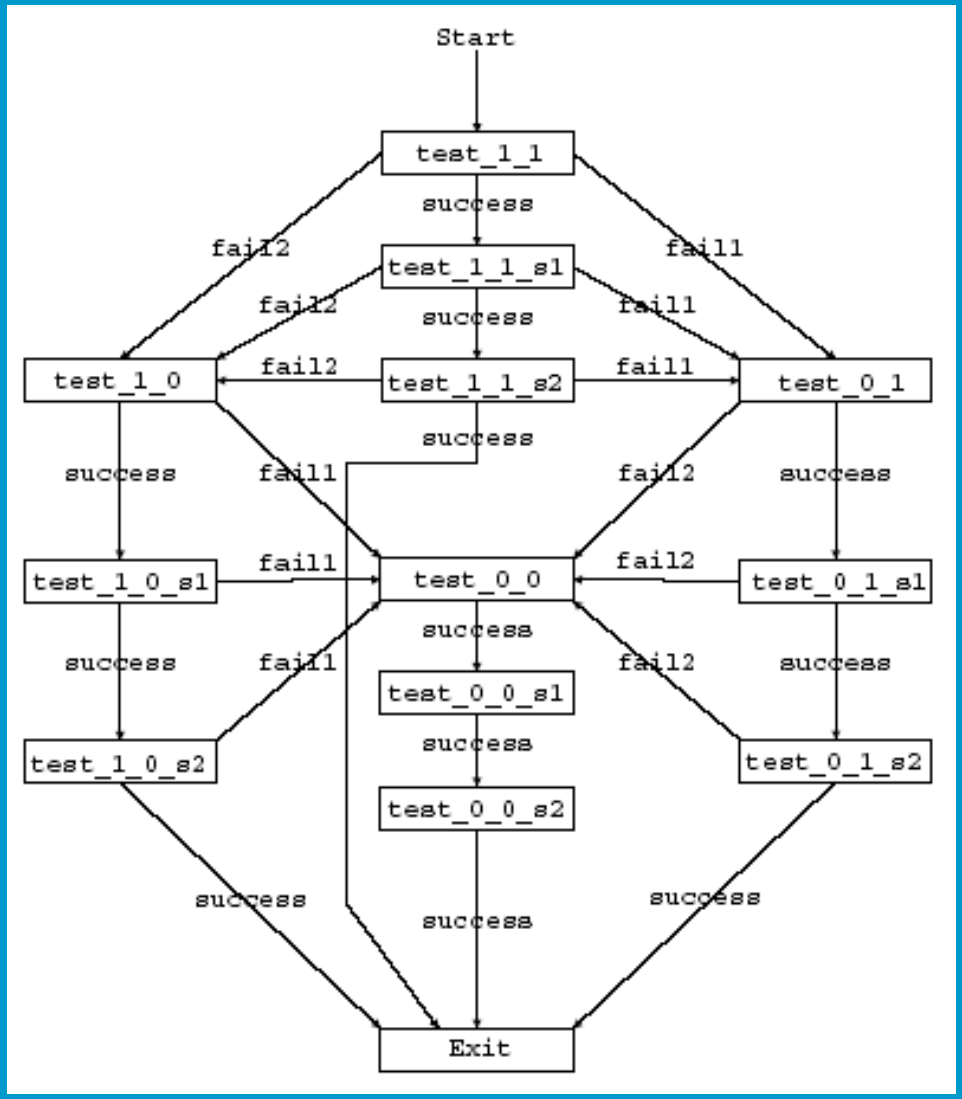
# Consecutive success mod

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# Benefits of process modeling

- Given the number of stages, defects at each stage, the activation probabilities, and parameters every detail of the Markov chain and its analysis can be generated.
- Each state represents one possible state of the overall testing process.
- Each arc represents a possible outcome of a single test of the system.
- Standard Markov chain statistics have meaningful interpretations and key testing questions are answered in the statistics.
- All computations are *O (n log n).*

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# Software Available

SQRL manager

For:

- Sequential stage testing
- General Markov chain model based testing

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